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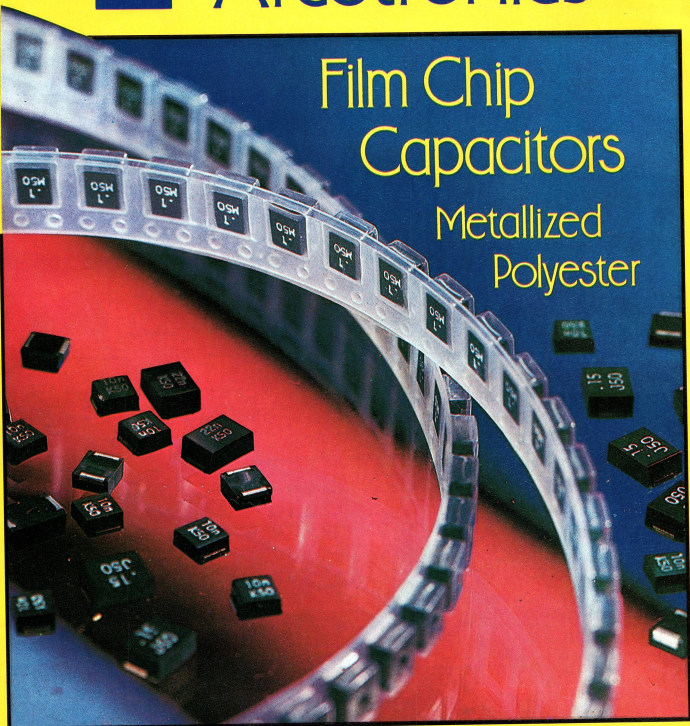
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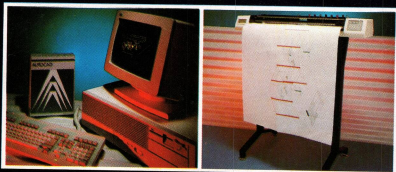
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ELECTRONICS TODAY INTERNATIONAL is published and distributed monthly by the Electronics Division of the Federal Publishing Company Pty Limited, 180 Bourke Road, Alexandria, NSW 2015 under licence from Double Bay Newspapers Pty Limited, General Newspapers Pty Limited and Suburban Publications Pty Limited. Printed by Hannanprint, Sydney. Distributed by Magazine Promotions. Maximum and recommended Australian retail price only. Registered by Australia Post, Publication No NBP0407. ISSN No 0013-5216.
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COVER: Photography Peter Beattie, design Brian Jones.

Solar winners

A group from the Joint Microelectronics Research Centre (JMRC) at the University of New South Wales, headed by Dr Martin Green, has announced the development of a solar cell with 19.1% efficiency. This significantly improves on the 11% to 13% efficiency typical of commercial cells. The news is spectacular because the process that produced them is claimed to be commercially viable.

The JMRC group first hit the news in October last year when the team announced the world's most efficient solar cell under unconcentrated light. This glory had to be shared a little later when a team from Stanford University developed a cell with an efficiency of 27.5%, but under highly concentrated light.

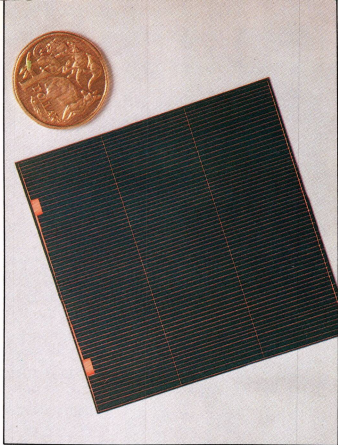
The essence of the earlier JMRC development was to etch 10 μm grooves into the surface of the silicon. This increases the efficiency of the cell by reducing the reflection of incidence light.

At Stanford, a system of Fresnel lenses was used to focus the sun's rays on the active surface. However, this system requires a sun-seeking active lens and can only use

the direct component of the sun's radiation (typically about three quarters of the total).

Both systems are too expensive for normal commercial use. The Stanford model has its price effectively set by the sophisticated lensing and seeking system. The high degree of purity required to achieve the JMRC result is obtainable only at a price too. However, there is great interest in those cells for use in concentrated systems.

The JMRC team has spent this year looking at ways of making their ideas work in less expensive materials — the types that are used in normal production. They have been working with standard substrates taken from BP So-



A high efficiency laser-grooved cell from the JMRC.

lar's production line. Their process uses a laser to cut very narrow and deep slots in the silicon which are then plated full of copper. This results in a highly conductive metal grid that obscures only 2% of the

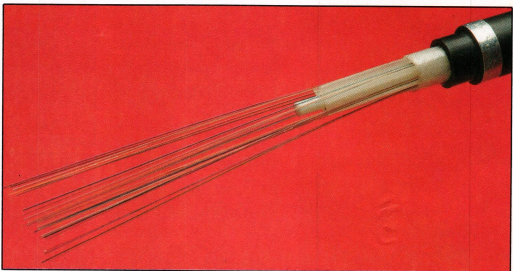
silicon surface. BP Solar is moving towards mass production of these laser-grooved solar cells and pilot production should begin next year.

Wiring the CBD

Melbourne's Central Business District telecommunications system will be able to transmit more information at greater speed because of the replacement of the existing copper cable network with fibre optics.

Olex Cables has won a bid to supply Telecom with 44 kilometres of optical fibre cable for the new system. It's currently being installed in existing cable ducts.

Manager of Olex's Fibre Optics Division, Mr Brian Wright, says the new system will give Melbourne's CBD a long overdue, high-quality communications system. "The fibre optic cable network will allow for high-speed, high-quality information transmission and will give Telecom a strategic presence in optical fibre wideband networks and switching systems in Melbourne's CBD.



A sample of the Olex optical fibre cable used by Telecom for the Melbourne CBD telecommunications project.

"It will also allow Telecom to develop engineering expertise in working with optical fibre cable distribution, wideband office networks and wideband switching systems," Mr Wright said.

The multimode optical fibre network consists mainly of

30-fibre cable with some sections of 12-fibre and 60-fibre cable. The cable sheath is constructed of polyethylene and is filled with jelly. Each fibre used inside a building will also have a flame-retardant coating for safety purposes.

The fibre-optic network is being installed alongside existing copper cables, and will run in a loop through the Batman, Lonsdale, Exhibition and Russell Street exchanges.

Olex will supply 95% of the fibre needed for the project. Total cost is \$440,000.

Studying the greenhouse

Scientists have long known that the atmosphere acts as a greenhouse, letting in sunlight and preventing much of the heat from escaping. The greenhouse effect has been expanding for the past 50 years and will increase with the continued use of fossil fuels that release carbon dioxide into the atmosphere, blocking heat from escaping to space.

The anticipated change in the greenhouse effect caused by increased carbon dioxide is less than about 1 per cent. Scientists believe that even this small amount of change will be significant and could be associated with droughts and rising sea levels. However, reliable estimates of how the Earth's climate will be altered by the greenhouse effect are not yet possible.

Winds and ocean currents are another important influence on the Earth's climate because they are closely related to the flow of energy from the sun to the Earth and space. Some scientists think that changing cloud patterns will alter the energy flow and influence the amount of heat stored in the ocean, thereby modifying the movement of heat from one part of the ocean to another.

Earth's energy budget has been studied for decades with

sounding rockets, balloons and satellites. However, the studies have been limited by incomplete coverage and sporadic observations.

Now NASA is starting to see results from some long term satellite studies. Preliminary data from NASA's Earth Radiation Budget Experiment (ERBE) suggests that clouds reflect more heat than they retain. Clouds appear to cool Earth's climate, possibly offsetting the atmospheric greenhouse effect.

The ERBE instruments measure Earth's heat budget, the amount of sunlight that reaches and is absorbed by Earth and the amount of energy radiated back to space. Even small changes in any component of the budget can have important effects on weather and climate. The instrument's accuracy in identifying clouds and clear parts of the atmosphere is helping to resolve many scientific questions about the future of Earth's climate.

ERBE is a three-satellite project that began in October 1984, when ERBS was deployed into orbit from the shuttle, Challenger.

A second ERBE instrument package is aboard NOAA-F, a National Oceanic and Atmospheric Administration weather satellite launched into



polar orbit in December 1984. A third ERBE package is scheduled to be sent into polar orbit aboard the NOAA-G satellite later this year.

The ERBE instruments measure the average monthly heat budget on regional, zonal and global scales, track the seasonal movement of heat from the tropics to the poles and determine the average daily variation in heat on a 620-mile regional and a monthly scale.

Each ERBE package contains two radiometer instruments called a scanner and a non-scanner. The scanner is a narrow field-of-view scanning radiometer that makes shortwave

measurements of reflected solar energy and longwave measurements of Earth-emitted energy.

The non-scanner has two wide field-of-view sensors that view the entire disc of Earth from limb to limb, two medium field-of-view sensors that view a 10-degree region of Earth and a solar monitor that measures the total output of the sun's radiant energy.

For the next several years, a team of scientists from around the world will continue to examine ERBE data in an attempt to improve understanding of the global heat flows that interact to keep Earth's climate in balance.

BWD spreads

Corporate Development, part of the BWD Industries group, has formed a joint venture with the Queensland Industry Development Corporation (QIDC), aimed at assisting the development of high technology companies in Queensland.

Both the QIDC and Corporate Development will have equal representation on the board of the new joint venture company to be named Queensland Corporate Development.

The purpose of the joint venture is to identify small to medium companies in Queensland which have the potential to be further developed in the various fields of high technology, with particu-

lar emphasis on manufacturing for both the Australian and export markets.

It is intended that Queensland Corporate Development will take equity positions in such companies with the full agreement of the present proprietors. The joint venture will offer further technological, manufacturing, marketing and financial expertise and facilities.

The QIDC hopes to play an active part in the development of technology-based industries in Queensland by adding further employment, investment and export opportunities. Given the current parlous state of the Queensland economy, such developments are sorely needed.

ETI schools competition

The final judging of the ETI schools competition will take place mid November and winning schools will be notified.

One hundred and five

schools in Australia and 35 in New Zealand have entered the contest. Full details of the competition winners will appear in February ETI.

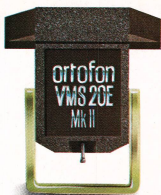
Engineers richest graduates

According to a study by Jenny Baldwin of Monash University, graduate engineers are now top of the money making stakes, beating lawyers, computer scientists and other high status professionals.

The study looked at the average salaries earned by graduates in their first jobs.

The average engineer starts on \$22,000. Law graduates can expect around \$21k, while computer grads may have to do with a measly \$20k.

The good news for those who believe there are far too many accountants in the country already is that they must make do with \$19k.



Sound facts in detail.

Ortofon have always dedicated themselves to pursuing the world's finest sound reproduction.

So when they discovered that the existing moving magnetic systems missed much of the sound detail, they did something about it.

They designed, developed and patented a new cartridge principle that could pick up as much detail as possible, accurately, from the record groove.

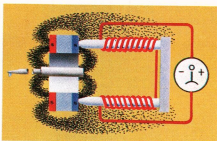
(Of course, as one of the recognized world leaders in sound reproduction, Ortofon were well-qualified in this area.)

They called it the VMS Principle.

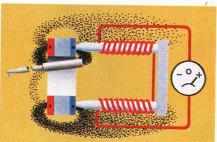
The VMS Principle (Variable Magnetic Shunt) utilizes a light tubular armature of magnetic conducting material.

This is attached to the cantilever and encircled by a powerful ring magnet. When the cantilever moves the armature closer to the ring magnet, the armature short-circuits part of the magnetic field, generating a voltage in the coils.

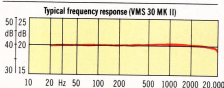
And the result is an increased high frequency tracking ability, low distortion and superb



Symmetrical flux fields with the armature in the central (neutral) position. These flux fields emanate from the magnet positioned in front of the pole pins. As the fields are in balance, there are no changes in flux around and inside the coils. Therefore, no voltage is generated.



When the cantilever moves, the armature is brought closer to the ring magnet and acts as a shunt, short-circuiting part of the magnetic field. As a result, the flux field in front of the pole pins varies, and a voltage is generated in the coils.



Technical data		VMS 30 MK II
Weight		5 g
Type of stylus		Fine Line
Equivalent stylus tip mass		0.45 mg
Frequency response		20-20,000 Hz
Output voltage at 1000 Hz per 5 cm/sec		5 mV
Channel separation at 1000 Hz		27 dB
Channel balance at 1000 Hz		2 dB
Compliance static, vertical		28 µm/mN
Compliance dynamic, lateral (10 Hz)		22 µm/mN
Recommended tracking force		13 mN (1.3 g)
Tracking force range		10-16 mN (1.0-1.6 g)
Tracking ability at 315 Hz lateral		90 µm
Vertical tracking angle		20°
FIM distortion		1% (13 mN)
DC resistance		800 ohm
Inductance		600 mH
Recommended load resistance		47 kohm
Recommended load capacitance		400 pF

transient reproduction – right down to the very last detail.

As if that wasn't enough, the VMS also reduced sensitivity to hum pick-up and minimized distortion and non-linearity in the magnetic system.

Presumably, the cost of an Ortofon VMS Magnetic Cartridge would be high.

Surprisingly, it's not. In fact, it's especially affordable.

Check the facts on the VMS 10E MK II, 20E MK II and 30 MK II at your hi-fi or Ortofon dealer.

And while you're there, find out how to home-test your stereo equipment with the Ortofon Pick-up Test Record.

It's another sound fact in detail.

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R6522AP 2MHZ (= NEC 765)	\$7.62	4.59
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R65C21 P3 3MHZ	-	4.59
R65C24 P1 1MHZ	6.67	3.67
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Icy hot line

Recently a PABX system left Philips' plant at Moorebank NSW on a long migration south.

The Philips DLS110S was headed for the Department of Science centre at Kingston, Tasmania to be shipped to the Australian research station at Davis, in the Antarctic.

An essential piece in the Davis station upgrading of local telephone and international communications, the DLS110S will be linked by satellite with the Antarctic Division's PABX back at Kingston — which is a Philips D1200.

Peter Magill, communications engineer with the Department of Science, explains that the Davis PABX will have 50 extensions with one tie-line to Kingston.

"Because the Davis winter complement of 22 rises to 50 or 60 during summer," says Peter Magill, "we have allowed for expansion of the tie-line facility as traffic requires."

Government purchases aid exports

Recommendations for a more dynamic approach to purchasing by the government, in order to help Australian firms open up new opportunities in international markets, have been put to the Committee of Review on Government High Technology Purchasing Arrangements.

The proposals were advanced in a joint submission by the Department of Industry, Technology and Commerce and the Department of Local Government and Administrative Services.

Major recommendations in the submission are:

- more widespread use of investment analysis (including risk analysis) in high technology purchasing to assess the potential costs and benefits of undertaking product development as opposed to direct purchase;
- the seeking of expressions of interest before proceeding



The Davis Antarctic Station where the Philips system is headed.

to full tendering as a general rule in high technology purchases, to reduce industry's costs in responding to tenders;

- measures to streamline and improve purchasing procedures to facilitate local industry's competitive entry into government markets;
- forward procurement planning and regular briefing sessions by government agencies to inform companies of the government's future needs;
- a program to contract to

local industry strategic research and development activities arising out of the Government's high technology needs; this would effectively redirect to the extent of \$50 million over five years the research and development component of existing high technology purchases by the Commonwealth, to the benefit of local industry;

- a \$5 million fund to facilitate the trial and demonstration within government departments and authorities of high

technology Australian products with international market potential to prove the performance of local products.

The proposed initiatives would have significant impact on those high technology industries most involved in supplying the Government's needs. These include communications equipment, computer hardware and software, micro-electronics and electronic components, aerospace and scientific and medical equipment.

Receiver specs for TV planning

A specification issued recently setting out performance levels for household television receivers is believed to be only the second of its kind developed in the world.

The document specifies the performance levels of a typical domestic television receiver and antenna in Australia.

The Department of Communications has developed the document in consultation with manufacturing and broadcasting industry bodies.

The specification is only advisory but is expected to be a strong inducement to manufacturers to observe specified performance levels and thus bring about valuable improvements in receiver quality, DOC Minister Michael Duffy said.

The Minister said that the data gathered for the specification may be used as input for the eventual development of a television receiver performance standard. It was hoped that a

draft standard would be available in 1987.

One section of the specification notes that planning of television services can only proceed on the universal availability of UHF and VHF tuning facilities. "The UHF band is being used more and more for television services around Australia and it will be in everyone's interest for manufacturers and importers to cease putting VHF-only sets on the market," Mr Duffy said.

"Buyers of television receivers should be aware that although VHF-only sets are a little cheaper, they are certainly not getting a bargain."

The Minister said it was noteworthy that to the Department's knowledge, no other country in the world apart from West Germany had produced such a specification.

Copies of it are available from Department of Communications offices in all States, the Northern Territory and the ACT.

The space station

The US House of Representatives has earmarked \$7.7b this financial year for NASA to begin work on the space station.

But NASA's plans have been cut back in view of the Challenger disaster to allow for construction of a station that can be built with fewer trips into space and less money from the government.

Original plans called for a 'twin keeled' structure rather like a cube, with living quarters and laboratories at each vertex. This structure has been cut in half to the so-called 'single keeled' option, so that it now consists of a long boom, with pressurized modules at either end, and solar panels, antennae and various non-pressurized experimental packages either bolted to the keel or attached to outriggers.

One consequence of the moves is that plans to internationalize the space

station have been sharply curtailed. The European Space Agency and Japan were to have supplied pressurized laboratories for the twin keel. Now both orders have been delayed until the middle of the next decade, at the earliest.

Only the Canadian contribution remains. The Canadians are building the remote manipulators that will crawl along the keel and do the heavy moving and lifting. Canada has specific expertise for the job, developed in work on the space shuttle manipulator arm.

According to James Fletcher, NASA's administrator, constructing the space station will take only 31 shuttle flights. The first construction crew will go up in 1993. By the fifth mission the keel will be laid out, and by the eighth, in mid-1994, both pressurized modules will be ready for work. The rest of the trips will be for lifting scientific and military payloads up to the station.

NEW FACES



This month we welcome a new staff member, Terry Jack Kee. Terry was born and raised on a plantation in the wilds of Africa. One day, while caught between a lion and a rampaging bull elephant he saw a lissom young native girl with resistors hanging from her ears singing a strange and evocative lullaby as she swayed across the veldt. (Heavy duty poetic writing from the ed).

Being but an impression-

able young lad he decided to dedicate all his life to finding out about these things. Months later, Terry surfaced in England, studying young girls, resistors and mysterious hums for all he was worth.

And our Terry was no slugard. Before you could say "Bob's yer Uncle", there he was, with a Masters degree and the whole world his oyster. This being the case he buried himself in the BBC, where they eat young engineers for breakfast.

But something was missing. The problem was the sun, or lack of it. Confronting the tube on yet another grey day, (more poetic writing) he decided to go find a bit of warmth, so he rode right on down to the airport and fronted the nice lady in the ticket office, who tried to sell him a ticket to Vienna. But he knew what he wanted, and next day came flying through the window at ETI, where he landed on the editor's desk and said: "hire me".

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The year of audio

1986 was seen as the year that audio would finally make a comeback as one of the dominant product groups in the electronics industry. Compact disc players would lead the rush, with hi-fi components a close second.

While not as bullish as some had predicted, the market is still looking pretty good. According to information from CESA, the Consumer Electronics Suppliers Association, component systems and 3-in-1 sales are up about 8.3% on last year's figures. The hi-fi flyer has, indeed, been

compact disc player where sales have more than doubled over the corresponding six month period last year. In fact this phenomenal growth in compact discs has more than compensated for the sales drop in other areas of hi-fi.

Sales of amplifiers, receivers, turntables and tape decks have all dropped in unit terms by between 13% and 18%. Total hi-fi systems have also dropped in unit terms by approximately 18% whilst music centres are down by 7%.

Turners have not declined in

sales by as much as the other components and this could easily be attributed to AM stereo tuners achieving a good level of sales.

At the other end of the scale equalizers have suffered a big drop in unit sales (approximately 34%).

The complete reverse in component sales can be said of hi-fi speakers. For the six month period, hi-fi speakers were 23% up on last year. Undoubtedly compact disc players have caused many consumers to go for better quality speakers to match their CD players' dynamic range.

NASA tank conversion

NASA has awarded a seven-month, \$93,000 contract to Martin Marietta to study the feasibility of converting a Space Shuttle external tank to an orbiting telescope.

According to NASA's Max Nein, the proposal to transform the external tank into a gamma ray imaging telescope (GRIT) to study gamma ray sources in the universe, appears possible. Studies have determined that the spent tanks, 47 metres long and 8 metres in diameter, could be carried into orbit rather than discarded just before the shuttle achieves orbit. Components of the telescope would be carried in the shuttle's cargo bay along with other payloads. Because the telescope would require periodic maintenance, it will probably orbit near the planned space station, 400 km above Earth.

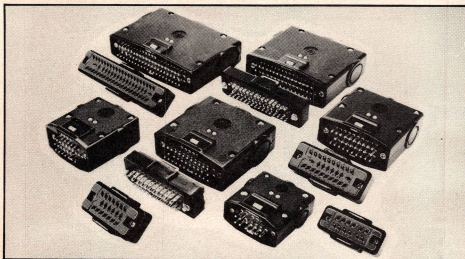
The proposal was initiated by Dr David Koch at the Astrophysical Observatory of the Smithsonian Institute.

Once in space, residual propellants would be expelled from the tank and astronauts could assemble telescope components within the liquid hydrogen tank. They could enter the tank via an existing 36-inch aft manhole port or through tank modification. The tank would then be pressurized to provide the needed environment for the gamma ray detection technique.

In operation, gamma rays would be converted by a lead plate into positrons and electrons which travel the length of the telescope emitting light. The light would be imaged onto a detector by a large mirror spanning the diameter of the tank. Since gamma rays reflect the highest energy processes, gamma ray astronomy is essential to understanding the evolution of stars and the universe and to the physical processes occurring in pulsars, quasars and black holes.

Nein said NASA plans to conduct a separate gamma ray survey using the orbiting Gamma Ray Observatory (GRO). The gamma ray imaging telescope would follow up the work of the GRO by enabling NASA to conduct even more detailed gamma ray studies.

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South Africa on SW

As South Africa finds world media channels less and less sympathetic it has increasingly turned to shortwave broadcasts to disseminate its views.

Established in 1966, Radio South Africa originally used 250 kW transmitters, then upgraded to 500 kW ones. It is now heard worldwide except in Australia and New Zealand. Reception is difficult in this region due to the signal crossing the auroral zone.

Johannesburg's first radio broadcast was made 29 December, 1923 by the South African Railways. In 1924 the Scientific and Technical Club took over transmissions on the Witwatersrand then in September the same year the Cape and Peninsula Broadcasting Association began broadcasting in Cape Town.

Listeners in Durban were introduced to wireless three months later.

Revenue, however, was a problem and in 1927 the Schlesinger Organization incorporated the three stations into the South African Broadcasting Company. Financial difficulties continued to limit the spread of radio and not long after, a government enquiry was ordered into all aspects of South African broadcasting. The result was the establishment in 1936 of the SABC in the terms of a new Act. SABC accordingly celebrates its 50th anniversary this year.

The new national radio service originally broadcast in English only, but the Act provided for a parallel Afrikaans service. By 1937 transmissions were being broadcast in both languages.

In the 1940s SW broadcasts



Verification card from Radio RSA.

from Cape Town, Durban and Johannesburg were monitored by the writer. The 5 kW transmitters used were given away for 20 kW ones transmitting from Paradys near Bloemfontein which were used until the opening of Radio South Africa in 1966.

Until the 70s studios were located in the centre of Johannesburg from where they moved to a complex at Auckland Park.

Radio RSA broadcasts in 11 languages for 208 hours per week. It receives over 100,000 letters from listeners per year. English broadcasts are 0200-0256 UTC on 5980, 6010, 9615 kHz; 0300-0426 UTC on 3230, 4990, 5980 kHz; 0630-0730 UTC on 5980, 7270, 9585 and 11900 kHz. Other audible transmissions are 2100-2156 UTC on 7270, 9585 and 11900 kHz.

— Arthur Cushen

Communications software booming

Software-driven intelligent products hold the key to substantial export sales for Australian electronics companies, according to the Australian Electronics Industry Association (AEIA).

While software development is usually associated with the computer industry, the electronics industry has been researching and developing "intelligent" communications equipment, using software programs, since the early 1960s.

Major companies such as Ericsson and STC, for example, now devote about 30% of their R&D workforce to software development on various products.

Software programs are being used for a range of telecommunications needs, from network control and packet switching to testing and diagnostic network maintenance, as well as in a myriad of other electronics products such as electronic funds transfer (EFT), office automation equipment, and the whole Telecom public telephone network.

This R&D effort is now paying dividends in the form of technologically advanced products with widespread export potential.

At STC, a range of energy

management systems has been produced which Technical Director, Bruce Jones, claims are the first of their kind to be developed in Australia: office automation systems that allow computers to work through small business systems; electronic funds transfer at point of sale (EFTPOS) equipment, and the new Credit Card Public Phone.

"Australia is at the leading edge of EFTPOS development and our work in developing communications software for the network has good local and export potential," Mr Jones said.

In the shorter term, STC is creating opportunities by the use of enhanced software equipment such as its PCM multiplex and optical systems.

Another company, Ericsson, is so excited about the current and potential export sales of three software-driven products it has developed in Australia that it has set up an export division to handle them.

The three products are the ASDP 162, an automatic telephone call distributor, the FDS 10, a specialized application of the ASDP system, and the AXE 104, a rural public telephone exchange system.

According to Mr Brian McKay, Ericsson's Director of Corporate Relations, export sales from these three products are expected to exceed \$50 million by 1988, well above Ericsson's current export sales level of \$20 million.

"These products have used new software programs to create new applications and open new markets," Mr McKay said. "The original FDS 10 queuing system, the ASDP 162, for example, has been on the market for 10 years, and 73% of its sales now come from overseas.

"We have now launched the FDS 10 version of the product to the money market, which has an obvious need for fast, accurate communications and reliable data.

"The AXE 104 is another good example of modern computer programming. It uses the same hardware technology as the original AXE public exchange (which has been the building block of the telephone system in Australia and in 68 other countries) but completely different software, and a completely new processor with a new high-power operating system.

"This software, which has been totally developed in Australia, allows the smaller

AXE 104 to emulate the larger exchange's capacity, at a cheaper price. Because the software is totally compatible with the original AXE, the AXE 104 immediately has the potential to be exported to at least 68 other countries. It's a prime example of a product built in Australia for the world market."

AWA is another telecommunications company which sees strong export potential for its software-driven products. Chief among these is AWANET, an integrated services local area network which is soon to be installed in Sydney's Police Control Centre, and which has followed on applications for traffic control and other police work.

Industry sources claim there will be vast opportunities for new peripheral products in the telecommunications market, particularly as Telecom pushes ahead with its changeover to an all-digital telephone network and introduces the Integrated Services Digital Network (ISDN), which will allow any combination of voice, text, data, graphics and video to be used over a single telephone line.

NEWS DIGEST

PRIZES, PRIZES, PRIZES



Mr Sommerville receiving his \$10,000 worth of gear from Mr Mark Kelly of Sony.

Mr Gary Sommerville of Punchbowl (Sydney) was the lucky winner of the \$10,000 Sony Audio Visual System in a recent computerized draw which involved subscribers to ETI.



Brad McMaster getting it from David Cartwright (TI).

Lucky person number two is Brad McMaster of Seaforth (Sydney again) who won the Texas Instruments one chip micro evaluation board.



Merv Nixon from AWA Information & Control with the winning ticket and Peter Hayes from ETI.

And going interstate, Arthur Pounsett of Norlane in Victoria is the proud new owner of the Seiko wrist terminal he won in the ETI-AWA competition.

NOTES & ERRATA

Project 284, VCR alarm, Nov '86: The piezo electro transducer specified for this project also includes an oscillator in one package. We used Dick Smith Part No L7024 in the prototype. L7027 may also be used with a 2k7 resistor in parallel.



Dr Myles Harding and Dr David Jupp with another winner, Dr Dieter Plate, of the Division of Textile Industry.

CSIRO medals 1986

Research work in the widely differing fields of diamond recovery, remote sensing, industrial computer systems and wool textiles has been recognized in the awarding of CSIRO medals.

They were presented recently by the chairman of CSIRO, Dr Keith Boardman, at a meeting in Melbourne of the chiefs of CSIRO's 43 research divisions and units. Amongst those receiving medals were two we've noted.

Dr David Jupp came to the then Division of Land Use Research in 1976 with a background in mathematics which he applied to spatial analysis of natural resource data.

He played the primary role in developing remote sensing research in the Division, and the BRIAN (Barrier Reef Image Analysis) system is the realization of the novel methods and algorithms he created.

The joint undertaking by the Great Barrier Reef Marine Park Authority, CSIRO and the Australian Survey Office in applying BRIAN to reef and shallow water mapping was led by Dr Jupp. The significance of the success of this effort is recognized worldwide.

His further development of microBRIAN has produced one of the most powerful and versatile microcomputer based image analysis systems. This system is marketed by Microprocessor Applications (see ETI, July 1986).

Dr Myles Harding has been responsible for conceiving and developing the key elements in two projects which have a clear lead over existing technology and promise very substantial markets both in Australia and overseas.

The first of these developments is a high speed industrial vision processor now being manufactured and marketed by Vision Systems (see ETI, July 1986). The other is a discrete event computer simulation package which has been applied successfully to some major new Australian manufacturing facilities and for which a commercial enterprise is currently being established.

Although he had no previous experience in either technology, in late 1981 Dr Harding agreed to lead a project to develop VSLI (very large scale integrated) circuit implementation of an industrial vision system. Within a very short time he had developed and verified new algorithms for connectivity analysis. A worldwide market survey was commissioned and this confirmed that these developments were well ahead of the existing technology and promised significant improvement in cost/performance when compared with the most advanced systems currently available. Vision Systems is now marketing the vision system.

During 1984, in response to a specific request from PA Technology, Dr Harding developed a simulation program to model a complex palletizing operation for WD&HO Willis. Following the success of this work the same approach has been applied to a number of large industrial systems. The techniques developed by Dr Harding have been shown capable of simulating complex plants and processes impractical to simulate with existing methods. Many companies have indicated a desire to market this software. ●

PROJECT



Invitation

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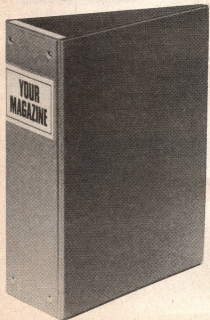
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Propagation conditions

A correspondent recently wrote complaining that some higher priced receivers failed to perform adequately. He was finding it difficult to hear signals on weekends too. This prompts me to outline ionospheric conditions that control the reception of shortwave signals—regardless of the price of receiver.

The present low sunspot count means the sun's surface is clean with little activity and a consequent lower ion concentration in the ionospheric layers. When the concentration is not high enough, radio waves are not reflected but are absorbed and 'lost' in the layers. Long distance AM and shortwave transmissions are only possible when reflected by the ionosphere.

The ionosphere is 400 kilometres thick and has four identifiable layers. The first is the D layer, 40 kilometres thick and with the lowest ionization. It starts at about 60 kilometres from the Earth's surface. The D layer is entirely a product of sunbeams and exists only in daylight hours. Because of its low ionization it reflects only long waves.

The next layer, the E layer, is 100 to 150 kilometres up. It too is the product of sunbeams but it survives at night, reflecting medium waves after sunset and making continental broadcasting possible.

Above the E layer, about 200 kilometres up, lie the F one and two layers. These two layers merge into one layer after sunset. The ion content and the height of the F two layer depend on both the time of day and the season. Usually it has the highest degree of ionization and is localized at a height of 250 to 400 kilometres. This layer reflects high frequency shortwaves which, with multiple reflection, are carried over the longest distances. Occasionally, there are so many reflections that the waves 'sail' around the world resulting in an echo effect. When the sun's cycle reaches its maximum activity point, extremely low power high frequency shortwave stations can be received in distant regions.

The sun's cycle lasts about 11 or 11 and a half years, with maximum activity in the third or fourth year gradually decreasing to a minimum in the following seven or eight

years. The last maximum period was in 1979-80 with an average of 155 sunspots per day. The number dropped to 140 per day in 1981, 116 in 1982, 67 in 1983, 44 in 1984 and 24 in 1985. The low sunspot count forces more stations to lower frequencies with consequent crowding and disturbance. So to those who were listening to absolutely nothing on 9 February this year during the worst disturbance of the ionosphere in 25 years, it wasn't your receiver's fault.

Listeners are able to receive up to date information on propagation conditions from WWV Boulder, Colorado, or WWVH in Hawaii at 18 minutes past each hour. These Standard Time and Frequency Stations operate on 5000, 10000 and 15000 kHz and announce the time each minute. There are also several standard announcements concerning the weather, shipping and other information.

Two programs on shortwave cover this information in layman's language, both originating from Radio Australia Studios in Melbourne. At the conclusion of Radio Australia's "talkback" program, Mike Bird gives a review of

past week propagation conditions and forecasts the coming week based on information from IPS Radio & Space Services, Sydney. "Talkback" is broadcast Saturday 0310 and 1610 UTC and Sundays 0530, 0910, 1230 and 2040 UTC.

The same type of information is available on Radio Nederland's "Media Network" program broadcast on Thursday at 0750 UTC on 9630 and 9715 kHz and repeated at 1050 UTC on 9650 kHz. Jonathan Marks of Radio Nederland discusses by telephone with Mike Bird in Melbourne the present propagation situation.

Those listeners in Australia wishing to receive the latest information on propagation conditions can phone the ionosphere Prediction Service in Sydney on (02) 269-8614 which has details of the present situation and predictions for future reception conditions. The tapes are changed daily at 1000 UTC.

This interesting service will be appreciated by many who in the past have listened to WWV, but would like to get the information from a source in the South Pacific.

— Arthur Cushen

LATIN AMERICAN NEWS

COSTA RICA: A new station in Costa Rica called Radio for Peace is being planned by a United States group. The 10 kW transmitter will be located at a University Campus in Costa Rica. The antenna has been completed, according to Radio Nederland, and program preparation is under way. Most of the material will be in English and Spanish and later other languages will be added. As soon as finance permits the transmitter power will be increased, but for the start it is expected that Radio for Peace will cover the Caribbean area. Part of the program will be by sponsorship to keep the station in operation.

AWR Latin America has been testing on 15460 kHz and regular broadcasts are expected to be 1600-1800 UTC in English and 1800-2200 UTC in Spanish, and then a com-

bination of four other languages up to 2400 UTC. 11870 kHz is assigned also to the station.

GUATEMALA: AWR in Guatemala has extended its transmissions and is now heard 1100-1300 UTC on the regular frequency of 5980 kHz. It has been heard in Australia and New Zealand at that time.

HONDURAS: A new station in Honduras has been heard on 4755 kHz opening at 1200 UTC, and broadcasts are now on a regular basis after a period of tests. The test broadcasts were heard around 0930 UTC, identified as HRRI and first observed by Wally Singleton of Dunedin, New Zealand. Subsequent reception of the regular broadcasts have been heard in Australia and the station identifies following the National Anthem. According to "Sweden Calling DXers," HRRI is operated by the International Rescue Committee. The schedule is 1200-0200 UTC, and the

station's full address is: c/o Comité Internacional de Rescate, Bvde Cangrejil, Colonia Naranjal, Frente a la Casa Dr Vasquez, La Ceiba, Atlantida.

PERU: Another station on 4755 kHz is Radio Huanta 2000, which broadcasts from Huanta, Peru. This station commences operation at 1030 UTC and has generally faded out before the new Honduras station opens on the frequency. Radio Huanta 2000

broadcasts bright Latin American music with a typical morning program format.

This item was contributed by Arthur Cushen, 212 Earn St, Invercargill, New Zealand who would be pleased to supply additional information on medium and shortwave listening. All times quoted are UTC (GMT) which is 10 hours behind Australian Eastern Standard Time, and areas observing daylight saving time should add a further hour.

